

RGB-to-Colour difference converter

Based on a Linear Technology Application Note

The circuit diagram shows two LT1398's from Linear Technology used to create buffered colour-difference signals from RGB (red-green-blue) inputs. In this application, the R input arrives via 75- Ω coax. It is routed to the non-inverting input of amplifier IC1a and to 1.07-k Ω resistor, R8. There is also an 80.6- Ω termination resistor R11, which yields a 75- Ω input impedance

at the R input when considered in parallel with R8. R8 connects to the inverting input of a second LT1398 amplifier (IC1b), which also sums the weighted G and B inputs to create a $-0.5Y$ output. Yet another LT1398 amplifier, IC2a, then takes the $-0.5Y$ output and amplifies it by a gain of -2 , resulting in the $+Y$ output. Amplifier IC1a is configured for a non-inverting gain of 2 with the bottom of the gain resistor R2 tied

to the Y output. The output IC1a thus results in the colour-difference output R-Y.

The B input is similar to the R input. Here, R13 when considered in parallel with R10 yields a 75-Ω input impedance. R10 also connects to the inverting input of amplifier IC1b, adding the B contribution to the Y signal as discussed above. Amplifier IC2b is configured to supply a non-inverting gain of 2 with the bottom of the gain resistor R4 tied to the Y output. The output of IC2b thus results in the colour-difference output B-Y.

The G input also arrives via 75-Ω coax and adds its contribution to the Y signal via resistor R9, which is tied to the inverting input of amplifier IC1b. Here, R12 and R9 provide the 75-Ω termination impedance. Using superposition, it is straightforward to determine the output of IC1b. Although inverted, it sums the R, G and B signals to the standard proportions of 0.3R, 0.59G and 0.11B that are used to create the Y signal. Amplifier IC2a then inverts and amplifies the signal by 2, resulting in the Y output.

The converter draws a current of about 30 mA from a symmetrical 5-volt supply.

